



Unmaking Waste 2015 Conference Proceedings  
22 – 24 May 2015  
Adelaide, South Australia

## **Circular by Design: A model for engaging fashion / textile SME's with strategies for designed reuse**

Jen BALLIE and Mel WOODS

University of Dundee, Scotland

*Fashion / textile SME's (small to medium enterprises) are currently adding value to previously discarded textile waste by applying their practical skills, knowledge and expertise to rework and reuse. As a result, sustainable design strategies are beginning to emerge such as – zero waste pattern cutting, design for disassembly and upcycling. However, the scope for redesign will always be influenced by the first iteration. We really need to consider the complete lifecycle at the front end of the innovation process to optimise lifecycles and reduce post consumer waste. Further work is also required to inspire and educate the next generation of designers to the immense creative potential of reuse, and help the industry to understand its viability, scalability and role in the future (DeCastro, 2014).*

*At the same time, fashion systems are moving beyond material innovation towards a circular economy to support systemic change for fashion globally. As a result, new business models are beginning to emerge, moving beyond GDP towards different kinds of metrics – which consider people, value systems and behaviour change. This paper explores how the principals of the circular economy and the four pillars of sustainability (environmental, social, economic and human capital) might support business model innovation within fashion and textiles. To achieve this, an exploratory canvas tool for SME's titled 'Circular by Design' was devised to encourage new business ideas and innovation. The canvas tool places strategic design at the centre and supports an assessment of the lifecycle of each asset by mapping the different stakeholders, materials and processes to prototype and conceptualise closed loop systems.*

*'Circular by Design' was presented at the Scottish Textiles Symposium (2014) where three fashion / textile SME's were selected to participate within an interview series. According to Scottish Enterprise, this sector of the business community have highlighted there is a lack of resources for R&D innovation (Scottish Enterprise, 2013). The 'Circular by Design' model was tested as an innovation method, for SME's to consider new design approaches and business models. The aim was to expand upon the capability of SME's to embrace closed loop systems by using the tool to identify the most appropriate sustainable design strategies for their business, and in addition supporting them to map out future material ecologies.*

**Keywords: sustainability, design, circular economy, business models**

## 1. Introduction

We live in a 'throwaway and replace' culture, our growing population and demand for new products has placed huge pressures on our planet's resources. Our economy is locked into a system in which everything from production, economics and the way people behave favours a linear model of production and consumption, where resources pass through from distraction to disposal in a 'take-make-use-dispose' construct. It is estimated there are 9-10 billion consumers in the world today, this big scale, throwaway consumption means a huge amount of waste is continuously produced.

The circular model where resources are kept in economic use for as long as possible sits in contrast to the current dominant linear model. The principals of a circular economy, dubbed the great innovation challenge, are not only concerned with a reduction of waste but of benefits to the economy. We are seeing new models that can successfully combine specialist knowledge and cross-sector collaboration to create the most value per unit of resource. It is widely acknowledged that we need these kinds of solutions to the complex problems our world is facing and by adopting the circular economy into our businesses we not only sustain our environment but also present a new market force.

This paper focuses specifically on the practice of textile and apparel in the UK to consider a more holistic approach for designing and manufacturing within these sectors. A resource titled 'Circular by Design' has been developed by the authors and piloted in BETA, the aim is to explore sustainable design strategies within the construct of the circular economy. Though utilisation of the 'Circular by Design' resource, a more 'joined-up' approach is possible by considering strategies for connecting stakeholders across the supply chain.

Within the UK textile sector, there is increasing awareness of the requirement for new textile initiatives to be linked with the concept of the circular economy, but there is a lack of practical and accessible evidence available to provide support. To be able to fulfil this purpose, we explore the following research question:

1. How does the concept of 'circular by design' engage textile / fashion SME's with strategies for designed reuse?

This paper consists of a qualitative and inductive approach to answering that question with a focus on secondary data, supported by semi-structured interviews conducted with three different SME's interested in implementing circular economy practices within their businesses.

## 2. Context

The 'circular economy' is not a new term or concept, the theoretical construct was coined by Stahel in 1976. Despite many years of research that explored the aim of keeping physical resources in 'circles' or 'loops' of different kinds, it is only now gaining traction primarily due to global urgency concerning the unnecessary waste of materials.

Within the UK a number of organisations are leading the debate, WRAP was established (2000) followed a decade later by the establishment of the Ellen MacArthur foundation (2010), with Zero Waste Scotland (2011) followed by the Great Recovery Programme (RSA, 2012). There is related discourse across the EU, particularly in Scandinavia and the Netherlands, and internationally in USA, Japan and increasingly China, all of whom have taken up the idea of the circular economy within the last decade. The idea has gradually become accepted by businesses and some policy makers, supported by key agencies and NGO's.

Whilst some designers and businesses within the textiles and fashion sector understand the term 'circular economy' they might be less familiar as to how this can be applied one strategy suggests that we could change our way of designing, building in efficiency and resources for the future and apply these innovations at concept stage, pre-consumer.

## 2.1 Economic Opportunities

Traditionally in the past the textiles and fashion sector had an interest in recycling now, service design provisions are exploring new business models of ownership such as leasing and 'clothing-for-hire' (McKinsey & Company, 2013). There are profitable circular opportunities to reuse end of life clothing, which, in addition to being worn again it can be cascaded down to other industries to make insulation or stuffing, or simply recycled into yarn to make fabrics that save virgin fibres. It is worth acknowledging that it has become cheaper to make new clothes than it is to recycle, due to low cost clothing becoming less durable, and of poorer quality. The concept of the circular economy presents a scope for exploring alternative fashion and textile models for reuse (Fletcher, 2015). The RSA's Great Recovery programme is focused on the concept of (re) making, which taps into wider trends of micro-manufacturing and disruptive design. This is defined as a series of manufacturing steps acting on an end-of-life part or product in order to return it to like-new or better performance, with warranty to match (Charter, 2006).

## 2.2 The Role of Design

With 80% of a product's impact determined at the design phase, there is a compelling case to explore the role that designers can play. Here, for the purpose of this paper, the term 'designer' is applied to define fashion and or textile designers. However, it is worth acknowledging that traditional design disciplines are no longer a clear cut categorisation of design professionals, and that new hybrid roles are emerging, particularly within the area of systems and service design. This might imply that these new hybrid designers are better equipped than many to apply a more strategic approach to their business, however it cannot be the designer's responsibility alone to change whole supply chains. While we have sustained design capabilities within the UK, we are in danger of losing our manufacturing skills (Taylor and Townsend, 2014). and businesses must begin to develop design briefs around new business models that take account of provenance, longevity, environmental impacts and end of life (Thomas, 2013). Designers can play a different role to business experts, but to fully adapt to a circular economy, this responsibility cannot be undertaken in isolation. The circular economy goes beyond the capabilities of discipline specific designers and requires a systems approach to move beyond traditional approaches and connect design, production, consumption and waste management.

### 3. 'Circular by Design' as a Concept

The authors have applied the term 'Circular by Design' across a range of events (Design in Action, 2014-15) as a headline for promoting a holistic approach to design innovation.

Toolkits and innovation resources have flourished in recent years, as a way of allowing design strategy into other disciplines and sectors. Another example, created to facilitate the design of circular economy business titled 'Circular Business Board' (Maslin and Shayler, 2015), an adaptation of the business model canvas (Osterwalder & Pigneur, 2013). Maslin and Shayler (2015) have identified resource input and output, reverse channels and end of life strategy as essential components. It is worth highlighting that circular design might be disruptive as it aims to subvert the notion of designing 'out' waste by identifying opportunities for designing 'in' waste (Thomas, 2014). Thus expanding upon the work of Goldsworthy (2014) who claims that designers should perceive themselves as borrowers, and become custodians of materials in opposed to users. This moves beyond the commercial aspect of business moving beyond GDP (Porter, 2014) as community, people and their tacit knowledge and skills become valuable assets.

The 'Circular by Design' resource (see figure 1 below) was developed to mediate opportunities for 'joined-up' thinking and practice by supporting designers and businesses alike to identify opportunities for closed loop innovation. This focuses on end of life strategies at the beginning of the design process, achieved by plotting different assets and stakeholders across the supply chain, these assets might be; fibres, processes, materials, techniques, people, technologies, knowledge or expertise to visually depict different material journeys. Alongside asking the following questions;

- Who are your stakeholders?
- What is your design approach?
- What is your USP?
- What Behaviour Change is required?

### Circular by Design

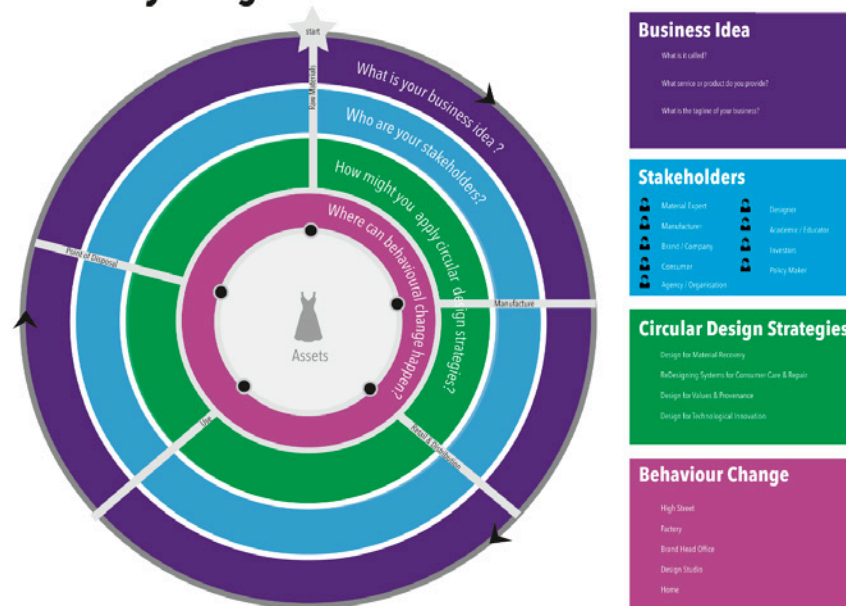


Figure 1: Circular by Design Canvas 1.0

#### 4. Piloting the Concept of 'Circular by Design'

The authors delivered a session titled 'Circular by Design' within the Scottish Textile Symposium (November, 2014). The purpose was to scope understanding around the circular economy within the fashion and textile sectors, through application of the likert scale method, to encourage respondents to specify their level of agreement or disagreement on a symmetric agree-disagree scale in response to five provocations (listed below). Approximately, sixty-three people from academia, business and policy participated across the textile and fashion sector

1. I understand the term 'circular economy'.
2. I am not sure how to apply the 'circular economy' as a concept to my work.
3. It is my responsibility to consider the complete lifecycle of my product or service post consumption.
4. I am being supported in introducing more sustainable practices within my business.
5. In your business consumers place a higher value on products / services produced with sustainable credentials.



**Figure 2:** Likert Scale Responses to Provocation "I understand the term 'circular economy', Scottish Textile Symposium (November, 2014)

Following on from the audience discussion, a twitter hour was hosted post event (February, 2015) using #circularbydesign and the same five provocations were disseminated online and experts (Earley and Goldsworthy, 2015) were invited to respond by drawing upon their personal expertise and further support conversation. Approximately, thirty-two twitter users responded and two hundred tweets were documented.

The feedback identified that while people were responsive and willing to engage with the concept of the circular economy, but they lacked confidence and there are limited practical examples. Sustainable design strategies such as; zero waste pattern cutting, upcycling and design for disassembly are becoming more widely adopted but remain small scale.



#### 4.1 'Circular by Design' Development in Conversation / Dialogue with Designers

The Circular by Design canvas was presented to three SME's from the UK fashion and textile sector to support semi-structured interviews. The canvas was applied to align conversation within the scope of the circular economy from a design perspective, with questions framed around their business practices. Their rationale for engaging within the research was to reflect upon their existing business and capture feedback. The canvas was introduced to provide an overview of a material journey from the point of conceptualisation by positioning the textile assets in the centre and working progressively through each stage of the lifecycle; from raw materials, to manufacturing, retail and distribution, use and reuse through to finally product disposal.

The table (*figure 2 below*) depicts an overview of the sustainable design strategies that are currently being adopted by these SME's alongside an overview of their original understanding of the circular economy, indicating both incentives and barriers.

Case	Sustainable Design Strategies	Knowledge of Circular Economy (CE)	Incentives to adopt CE	Barriers to adopt CE
SME 1	Strategically works with post consumer waste and begins with end of life strategies. This involves streamlining upcycling techniques to support re-manufacturing  Strategically exploring opportunities to rework existing garments and has developed tacit knowledge of the skills and resources required.	Understands the business implications of managing post consumer waste  Would like to identify mechanisms to measure environmental and economic impact.	Highlighted that there is scope for collaboration with external stakeholders, the importance of not working in isolation  Niche market opportunities and the importance of constructing a narrative around reworked products  Service design approaches provide reduced material impact and can be implemented at a lower cost	Working with fashion buyers existing lead times and quantities are not possible within CE  Won't work with fast fashion retail waste due to it being less durable. Military surplus provides more durable existing products for remaking  Turns down commissions often if the business case isn't strong enough  Tacit knowledge and experience isn't being sustained across generations.
SME 2	Design for disassembly  Open source fashion design innovation	expertise of smart energy efficiency within the building industry and familiar with tools to measure impact.  Aware of the CE and its relevance in sustaining material efficiency.	Exploring outsourcing production through social enterprise initiatives to support local manufacture.	Expressed a difficulty sourcing sustainable materials  There is a lack of provisions for fashion / textile designers Manufacturing within the UK. It is not yet possible to outsource small production runs.

SME 3	<p>Focusing on long life garments</p> <p>Sustainable material innovation using natural and environmentally friendly dyes, materials and supporting local manufacture</p>	<p>interested in garment lifecycle analysis and establishing a relationship with the end user to extend garment life.</p>	<p>Exploring a Design collective concept to combine skills and produce diverse capsule collections.</p>	<p>There are challenges sourcing sustainable materials within a small quantity. Within trade shows sustainable fabrics are in limited supply.</p>
-------	--	---	---	---

**Figure 3:** Table documenting Semi-Structured Interview Insights

#### **4.1 (1) Summary of Dialogue with SME 1**

SME 1 was focused on identifying business opportunities for re-designing reclaimed fashion waste usually surplus and unsold stock. New concepts for reworking this previously discarded waste are being piloted in partnership with Higher Education (HE) fashion and textile students. This business owner expressed that while there is a wealth of creative solutions they are always often not economically viable

#### **4.1 (2) Summary of Dialogue with SME 2**

SME 2 was focused on developing a lifestyle brand through a series of modular components designed for disassembly, these garments can be re-configured.

#### **4.1 (3) Summary of Dialogue with SME 3**

SME 3 was focused on the designing a capsule collections of 'Tops' in collaboration with other designers. These garments are produced by hand, locally and constructed using the finest materials.

### **5. Reflection on 'Circular by Design' Canvas**

The canvas and interviews provided a valuable insight into the feasibility and usability of the circular economy.

Delivering economic value was not a primary driver and other forms of value emerged, such as the ability for the business to capture economic, social and environmental value for a broader range of stakeholders. When discussing their design strategies all three were focused upon changing consumer habits towards longer life textiles and apparel and interested in producing garments that are easy to care for, repair, upgrade and recycle. Business thought consumers were open to behaviour change as evidenced by Braungart and Lovins (2013) who argue that not many years ago people would have been incredulous at the idea of recycling plastic bottles, yet this is now commonplace behaviour. However, there are real barriers facing businesses and others responsible throughout the products and materials whole lifecycles,

Each of the businesses discussed an interest in adopting new business models such as social enterprise approaches, scaling up production and recognised that the circular economy might bring greater employment especially in local entry level and semi skilled jobs and remanufacture.

## 6. Next Steps

From the outset it has become clear that there are varying levels of complexity in becoming circular through design due to a lack of transparency within clothing and textile manufacture, where stakeholders are often disconnected. However, the textile and fashion sectors might not truly embrace this new way of thinking or operating within the world until their existing modes are proven beyond doubt, through direct experience, to be failing the sector (Chapman, 2002).

The canvas will be refined within a residential innovation workshop by the same title 'Circular by Design' (Design in Action, March 18-20<sup>th</sup>, 2015) facilitated in partnership with Zero Waste Scotland with the aim of creating new and innovative business strategies. Following this further work will be undertaken to position the canvas as a resource for emerging businesses to design for circularity, from the point of conceptualisation. This will require collaboration outwith the design sector, new roles might begin to emerge for example, End of Life Specialists, Fashion Service Designers or Material Recovery Experts. The canvas will document these design approaches, identified stakeholders, value propositions and finally highlight what behaviour changes are emerging within the future.

## References

- Braungart, Michael and Lovins, Amy. "A New Dynamic: effective business in a circular economy". Ellen MacArthur Foundation (2013).
- Charter, Martin, and Scott Keiller. "Grassroots innovation and the circular economy: a global survey of repair cafés and hackerspaces." (2014).
- Design in Action, (2015). [www.designinaction.com/chiasmas/waste-scotland-chiasma/](http://www.designinaction.com/chiasmas/waste-scotland-chiasma/) [accessed 10th March 2015]
- Fahlen, Sara, and Linda Petersson. "Closing the Value Chain Loop in the Apparel Industry: A case study of current practices." (2014).
- Fletcher, Kate, Lynda Grose, and Paul Hawken. *Fashion & sustainability: Design for change*. London: Laurence King, 2012.
- Goldsworthy, Kate. "Laser-finishing: a new process for designing recyclability in synthetic textiles." PhD diss., University of the Arts London, 2012.
- Goldsworthy, Kate. "Design for Cyclability: pro-active approaches for maximising material recovery." *Making Futures* 3, 2014.
- Gregson, Nicky, Mike Crang, Julie Botticello, Melania Calestani, and Anna Krzywoszynska. "Doing the 'dirty work' of the green economy: Resource recovery and migrant labour in the EU." *European Urban and Regional Studies* (2014).
- Hill, Julie Elizabeth. "The circular economy: from waste to resource stewardship, part I." (2014): 1-11.
- Jensen, Charlotte Katrine. "The Rhetoric of Circular Economy in the Textile Industry." (2015): 102.
- Kant Hvass, Kerli. "Post-retail responsibility of garments—a fashion industry perspective." *Journal of Fashion Marketing and Management* 18, no. 4 (2014): 413-430.



Rowney, Mark. "THE WASTE LINE." (2014).

Löfgren, Johanna, and Hanna Enocson. "Textile and recycling initiatives—A step towards a circular economy." (2014).

Langdown, Amanda, and Valeria Ruiz Vargas. "Integrating Sustainable Development Within Teaching Fashion Education." In *Integrative Approaches to Sustainable Development at University Level*, pp. 539-550. Springer International Publishing, 2015.

Nguyen, Hanh, Martin Stuchtey, and Markus Zils. "Remaking the industrial economy." *McKinsey Quarterly* 2014.

Osterwalder, Alexander, and Yves Pigneur. "Designing business models and similar strategic objects: the contribution of IS." *Journal of the Association for Information Systems* 14, no. 5 (2013): 237-244.

Taylor, Jane, and Katherine Townsend. "reprogramming the hand: Bridging the craft skills gap in 3d/digital fashion knitwear design." *Craft Research* 5, no. 2 (2014): 155-174.

RSA and The Great Recovery, (2014). <http://www.greatrecovery.org.uk> [accessed 10th March 2015]

Visser, Wayne. "The Principles of CSR 2.0." In *CSR 2.0*, pp. 51-65. Springer Berlin Heidelberg, 2014.